

ESKOM LANDFILL SITE
TRAFFIC IMPACT ASSESSMENT

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TRAFFIC IMPACT ASSESSMENT	
PROPOSED GENERAL LANDFILL SITE & HAZARDOUS WASTE STORAGE FACILITY	
SUMMARY	
LOCATION	The site will be located in Grootstryd Farm in Lephalale.
LAND USE	The proposed development will consist of a General Landfill Site with a H:h cell and a Hazardous Waste Storage Facility for temporary storage of high hazard rating waste.
TIME FRAME FOR ANALYSIS	<p style="text-align: center;">Scenario 1: 2009 Existing traffic demand;</p> <p style="text-align: center;">Scenario 2: 2009 Background Traffic + Latent Rights</p> <p style="text-align: center;">Scenario 3: 2009 Background Traffic + Latent Rights + Development trips (construction trips)</p> <p style="text-align: center;">Scenario 4: 2010 Background Traffic + Latent Rights + Development trips {Once operational}</p> <p style="text-align: center;">Scenario 5: 2014 background + latent rights</p> <p style="text-align: center;">Scenario 5: 2014 background + latent rights + development</p>
STUDY AREA	<p>The following intersections were evaluated:</p> <ul style="list-style-type: none"> ○ Nelson Mandela Drive / Marapong Road; ○ Nelson Mandela Drive / Road 1; ○ Nelson Mandela Drive / Access to Matimba; and ○ Nelson Mandela Drive / Afguns Road.
ACCESS	The proposed development will gain access along the new haulage road which intersect with Nelson Mandela Drive. The access will have one entry lane and one exit lane.
TRIP DISTRIBUTION	<p>The following distribution for the Eskom Landfill Development was assumed:</p> <ul style="list-style-type: none"> • 70% from the east along Nelson Mandela Road; ○ 5% from the east along Nelson Mandela drive; ○ 65% from the south along Afguns road; • 10% from the west along Nelson Mandela Road; ○ 5% from the west along Nelson Mandela drive; ○ 5% from the north along Marapong road; • 10% from the north along Matimba road; • 10% from the north along a gravel Matimba road.
CAPACITY ANALYSIS	Refer to Appendix B , Results Capacity Analysis.
UPGRADING PROPOSED	<ul style="list-style-type: none"> ○ <u>Nelson Mandela Drive / Afguns Road (Provincial upgrade)</u>: A traffic signal is proposed. ○ <u>Nelson Mandela Drive / Road 1/ Haulage Road (Eskom upgrade)</u>: An extra 60m right turning lane on the eastern approach along Nelson Mandela Drive is proposed.
RECOMMENDATION	<ol style="list-style-type: none"> 1. The proposed developments should be considered favourably from a traffic engineering point of view by the relevant authorities, given the proposed access. 2. The developer (Eskom) will be fully responsible for the upgrades on Nelson Mandela Drive / Road 1 / Haulage Road including the construction of the access to site and the re-alignment of the road to Grootguluk Mine. The province (LRA) will be fully responsible for the upgrade at Nelson Mandela Drive / Afguns Roads. 3. The detail design of the proposed access should be designed by a professional engineer with suitable road design experience.

TABLE OF CONTENTS

Page

<i>glossary of terms</i>	<i>iv</i>
<i>List of abbreviations</i>	<i>iv</i>
<i>DEFINITIONS USED</i>	<i>v</i>
<i>1. Introduction</i>	<i>1</i>
<i>2. Background and UNDERSTANDING OF THE brief</i>	<i>2</i>
<i>3. Background and History of Site Selection Process</i>	<i>4</i>
<i>4. Study approach AND METHODOLOGY</i>	<i>7</i>
<i>5. Description of the Affected Environment – STATUS QUO</i>	<i>11</i>
<i>6. ROAD-BASED TRAFFIC IMPACT ASSESSMENT</i>	<i>15</i>
<i>7. Mitigation MEASURES PROPOSED</i>	<i>23</i>
<i>8. CONCLUSIONS</i>	<i>23</i>
<i>9. Recommendations</i>	<i>24</i>
<i>10. References</i>	<i>25</i>

GLOSSARY OF TERMS

aaSIDRA	Traffic engineering analysis program
Trip Generation	Assumed futuristic new trips for a development
Sidra results	Output of analysis
TSS Aimsun	Output of analysis

LIST OF ABBREVIATIONS

LRA	<i>Provincial Government – Limpopo, Roads Agency</i>
EIR	<i>Environmental Impact Report</i>
HCM	<i>Highway Capacity Manual</i>
kph	<i>Kilometres per hour</i>
LDV	<i>Light delivery vehicle (bakkie)</i>
LOS	<i>Level of service</i>
pcu	<i>Passenger car unit</i>
PDNA	<i>PD Naidoo and Associates Consulting Engineers (Pty) Ltd</i>
RoD	<i>Record of Decision</i>
TIA	<i>Traffic Impact Assessment</i>
V/C	<i>Volume to capacity ratio</i>

DEFINITIONS USED

Level of service (LOS) - This is a qualitative measure describing operational delay conditions within a traffic stream and their perception by motorists and or passengers as follows:

TABLE 1: Levels of service for signalised and unsignalised intersections according to the SIDRA⁽¹⁾ definition (HCM method)

Level of service	Average overall delay per vehicle (seconds)	
	Signals and Roundabouts	Stop Signs and Give-Way(Yield) Signs
A	<= 6,5	<= 5,0
B	6,6 to 19,5	5,1 to 10,0
C	19,6 to 32,5	10,1 to 20,0
D	32,6 to 52,0	20,1 to 30,0
E	52,1 to 78,0	30,1 to 45,0
F	> 78,0	> 45,0
Desirable / Maximum recommended	52 / 78	30 / 45

V/C - The ratio of the volume divided by the capacity of the lane, indicating the level of throughput on a road lane.

In urban conditions, planners usually choose a level of service D as desirable and E as a maximum ie beyond a level of service E, the conditions would be undesirable. Similarly, it is good planning practice to keep the V/C ratio below 0,9. In both cases, the impact **is significant** if the level of service is greater than 78 seconds or the volume to capacity ratio is greater than 0,9

1. INTRODUCTION

The proposed General Landfill Site and a Hazardous Waste Facility will be situated on the farm of Grootstryd in Lephalale. The locality of the proposed developments is shown in **Figure 1** (Provincial Map) and **Figure 2** (Locality Plan). Refer to **Appendix A**.

PD Naidoo and Associates (Pty) Ltd has been appointed by Envirolution Consulting on behalf of Eskom to undertake a Traffic Impact Assessment as part of the Environmental Impact Assessment (EIA) for the proposed General Landfill Site and Hazardous Waste Storage Facility. The proposed Landfill is expected to accommodate 1200 000 m³ of waste over a period of 50 years. It is expected that the proposed landfill will cater for Medupi, Matimba and two new proposed coal-fired power stations in the Waterberg area.

Lephalale area is a vastly growing area due to it's riches in coal minerals. It is expected that the population will grow due to the developments in the area i.e Eskom Medupi power station and other known developments around the study area the traffic is expected to grow as well. Based on our knowledge there are approximately 43 development application within the Lephalale area which have been taken into consideration when preparing this report.

A new haul access road leading to Matimba coal yard will be under construction in the near future. The road will intersect with Nelson Mandela Drive which is a Provincial Road.

Lephalale Municipal Council has approved plans for a new Southern Bypass Provincial road which will reduce the load off Mandela Drive. Nelson Mandela drive will be deproclaimed as a provincial road to a Municipal road. Airfields Road will be a link road between the proposed provincial road and Nelson Mandela Drive.

This study investigates the traffic impact of the proposed development onto the immediate surrounding road network and its site access(s) and determines whether it is necessary to implement any road and/or intersection improvements to mitigate the anticipated traffic impact.

The document titled "Manual for Traffic Impact Studies", prepared by the National Department of Transport in 1995, was applied in the preparation of this traffic impact study.

2. BACKGROUND AND UNDERSTANDING OF THE BRIEF

The purpose of this study was to assess the traffic impact directly associated with the General Landfill Site and a Hazardous Waste Storage Facility.

The **terms of reference** for the study, as indicated in the approved letter of appointment, were as follows:

Phase 1: Course level screening

- Site inspection, authority liaison/meetings and screening report.

Phase 2: Draft full specialist Traffic impact assessment report (TIA)

- Authority liaison/meetings and screening report.
- Classified traffic counts at four intersections
- Road network planning
- Presentation of draft scoping report

Phase 3: Presentation of draft full TIA report

- Presentation of a full scoping report
- Future volume forecasts
- Accommodation of construction traffic and additional staff
- Traffic impact determination including recommended mitigating solutions
- Draft TIA report

Phase 4: Revision of full TIA report

- Revision of draft TIA report to final status

Phase 5: Presentation of revised full TIA report

- Presentation of draft full report
- Provision for one meeting with public participants as part of the EIA process

The following **process** was adopted:

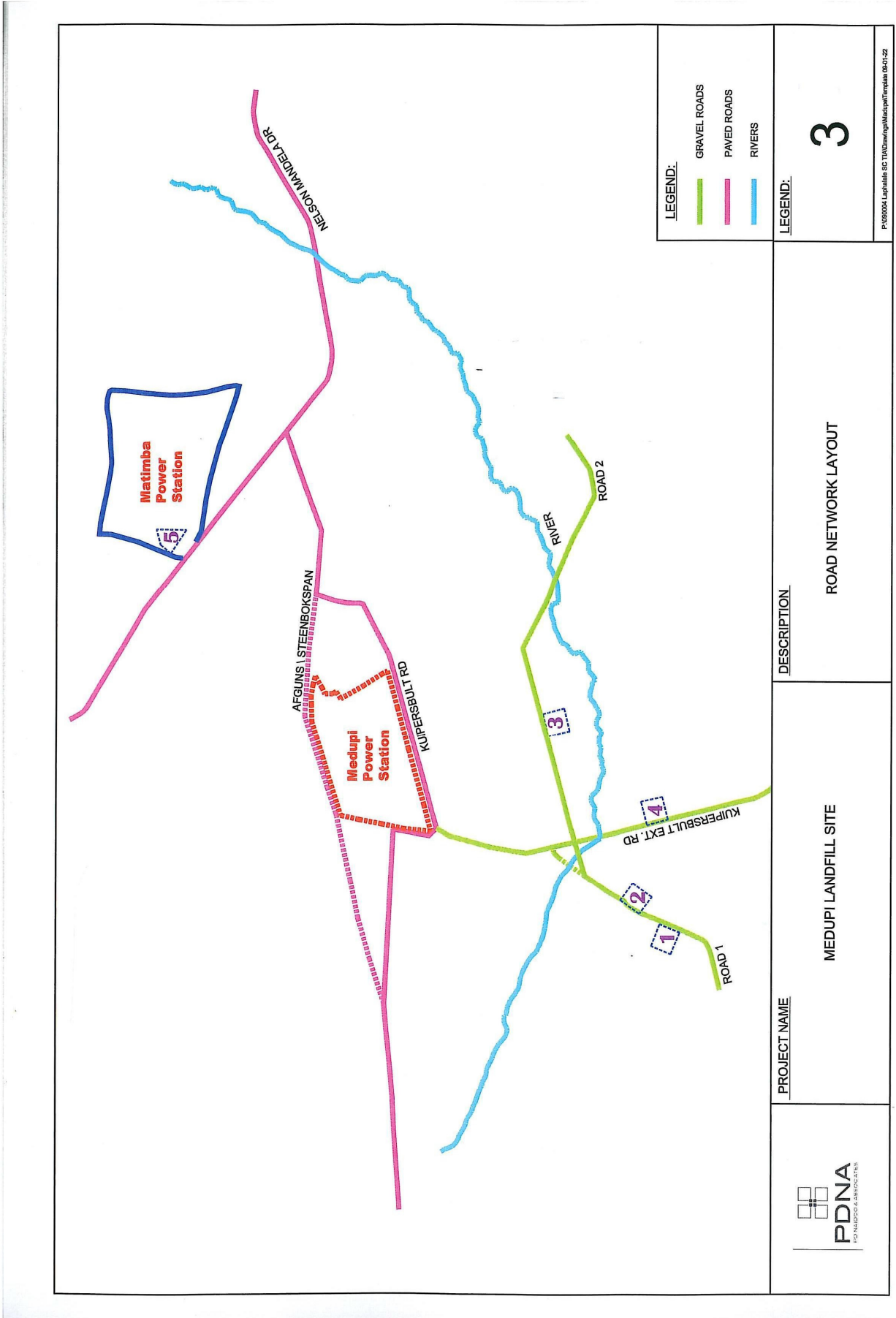
- Site inspection and meetings with the local and Provincial Road Authorities.
- Setting of study parameters including delimiting the study area, intersections to be counted, peak hours, time horizons for future traffic forecasts, etc.
- Classified traffic counts within the study area.
- Obtaining information and understanding the project and its associated traffic implications.

- Analysis of the existing and future traffic situations and propose measures to mitigate possible problems (if any required).
- Report on the findings
- Discussions with the project team and road authorities regarding the traffic impacts and the proposed mitigation measures (if any).
- Acceptance of the traffic impact assessment and the proposed mitigating measures (if any)

3. BACKGROUND AND HISTORY OF SITE SELECTION PROCESS

The proposed sites for this Landfill are located within the farms of Grootvallei, Hanglip and the farm located at 513 LQ. A site screening exercise was undertaken and these sites were narrowed down to Grootvallei as a possible site. Grootstryd was consequently added as an additional site to be considered for the siting of this Landfill.

A site visit was undertaken by the Design Engineers, Geohydrological and Geotechnical on 17 December 2008 to visit and groundtruth the Grootstryd site. The five sites considered in the scoping phase are depicted in **figure 3** below:-



Methodology

The access roads to reach each of the identified sites were determined. These sites were then compared relative to their access arrangements. The following criteria was used:

Site Selection Criteria	Site Scoring Against Criteria		
	High (2)	Medium (1)	Low (0)
Access To Site	Easy	Moderate	Difficult
Transportation Costs	Low	Medium	High

The availability of the road network and the travel time to and from the power stations was considered as well. The distance to be travelled and the condition of the roads are directly linked to transportation costs and were therefore the most important considerations when ranking the sites.

The major factors to be considered when the sites were scored in terms of Traffic and Transportation were:

- Access
- Transportation Costs
- Maintenance

Site 5 scored the highest and was therefore chosen as the best suitable site in terms of traffic and transportation due to its easy accessibility, the condition of the roads surrounding the site and that it is going to be cheaper to maintain the roads as most of them are hard surfaced.

Site 5 was further sub-divided into 3 parts namely 5a, 5b and 5c. Refer to drawing **Medupi Landfill – Site 5 – 5ha Options in Appendix C**. A new haulage road is to be built within site 5. All the proposed sites in site 5 are equally suitable and the deriving factor was the distance to be travelled from the Haulage Road to site 5a or 5b or 5c. Site 5a and site 5c are in close proximity with the new haulage road and therefore were preferred as suitable sites in terms of Traffic and Transportation for the proposed development however site 5b can still be used.

4. STUDY APPROACH AND METHODOLOGY

4.1 Information base

The information used in this study was based on the following:

- Existing 2009 traffic conditions counted as part of this study.
- Visual observations of the roads and rail lines and their associated infrastructure from a transportation engineering point of view.
- Information received from Envirolution Consulting

The General Landfill Site and Hazardous Waste Storage Facility will, to some extent,:

- Affect road-based traffic surrounding the proposed study area.
- Affect the road-based traffic during the construction period in the area surrounding the study area.

4.2 Limitations

- The most recent mapping used was extracted from Google Earth which closely reflected the situation as noted in the field visited.

4.2 Methodology

4.2.1 Study area

The study area chosen represents a fairly small road network surrounding the proposed site. The study area stretches from Nelson Mandela Drive in the east, towards Morapong township in the west and from Steenbokspan Road on south of the development. Refer to **Figure 2** for the roads included in the study area.

4.2.2 Data collection

No previous traffic surveys were available from the Lephalale local municipality; hence PDNA conducted the traffic surveys by recording the existing situation.

Site visits of the area, including discussions with the local Municipality and the Provincial Government – Limpopo, Department of Transport and Public Works (LRA) (in Polokwane), formed the basis of the data collection process.

In terms of the Department of Transport guideline to traffic impact studies, traffic surveys were undertaken at the major road intersections within the chosen study area, during the peak traffic periods. In this study however, it was decided to count over the full day-time hours to determine if any local peak hour traffic flows occurred other than at the normal commuter peak hours.

Traffic surveys were conducted by PDNA on Thursday 15 January 2009 from 06:00 in the morning to 18:00 in the afternoon. It should be noted that Medupi Power Station construction traffic is included in these traffic counts. However, there is no way of quantifying this traffic as an input to forecasting the future traffic flows.

Typically a Thursday represents a normal weekday as it excludes any weekend traffic flow characteristics. There may be periods in the year when the traffic flows are higher. However, the traffic engineering and road industry does not accept the worst case to be efficient as then road infrastructure would lay idle or be underutilised for the bulk of the year. Therefore the normal weekday, as per common practice, has been adopted in this study. The level of accuracy is normally within 10 percent of a typical weekday for the Thursday survey day. On Monday and Fridays, traffic could be some 10 to 15 percent higher due to some employees travelling away from home and return to their place of work at the beginning and end of the week, multi-purpose trips related to weekend traffic, etc.

Mapping was obtained from Metro GIS and Google Earth.

Information regarding the proposed Landfill and hazardous Waste Storage Facility was obtained from Envirolution Consulting Engineers.

Land use alternatives

The land use alternatives were supplied to the traffic engineer by the team and are summarised as follows:

TABLE 2: Land use alternatives

LAND USE	Life Span in Years	Volume
General Landfill Site & Hazardous Waste Storage Facility	50	1 200 000 m ³

4.2.3 Information processing

The traffic counts were captured onto a Microsoft Excel spreadsheet and depicted in Figure 4 on appendix A of this report.

TSS Aimsun computer program (version 6.3) was used for the traffic capacity analysis of the accesses and intersections. TSS Aimsun is a computer program used in traffic capacity analysis and is commonly used in South Africa and accepted by the Department of Transport. The output from the analysis is included in **Appendix B**.

Autocad was used to develop the drawings.

4.2.4 Assumptions made in the analysis

- Latent Rights

Goba Consulting Engineers was appointed by SSI Consulting Engineers as Traffic and Transportation specialist in the EIA process for Medupi Power station. The findings of this report were taken as latent rights when this study was conducted.

- Background road-based traffic growth

In terms of the background traffic growth, factors such as developing urban areas, tourism and through traffic need be assessed. Considering that no regional traffic model exists for this area, it is extremely difficult to forecast the future traffic flows in the study area. For this reason, a sensitivity approach was adopted in assessing the traffic impact of the future background traffic flows. The future development traffic was however, estimated using existing traffic counts and the project related information. Four transport scenarios were then developed in order to determine the traffic and transportation impact, as follows:

TABLE 3: Scenarios tested

SCENARIO	ASSESSMENT YEAR AND TRAFFIC DEMAND	ROAD NETWORK	FIGURES
1	Existing 2009 background traffic.	Existing 2009 road layout.	4
2	2009 background traffic demand + Latent Rights.	Existing 2009 road layout PLUS road improvements if required.	5
3	2009 background traffic demand plus latent rights plus construction generated trips.	Existing 2009 road layout PLUS road improvements if required.	8a
4	2009 background traffic demand plus Latent rights + plus operational generated trips.	Existing 2009 road layout PLUS road improvements if required.	8b
5	2014 background traffic demand.	Horizon 2014 road layout.	9
6	2014 background traffic demand plus development operational generated trips.	Horizon 2014 road layout.	10

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT – STATUS QUO

5.1 General overview of affected environment

5.1.1 Existing road network

Medupi and Matimba Power Stations are located approximately 10km west of Onverwacht residential township. The major connecting road is R510 which intersect with Nelson Mandela Provincial route shown in Figure 2. Lephalale Municipal Council has approved plans for a new Southern Bypass provincial road which will reduce the load off Nelson Mandela Drive. Nelson Mandela drive will be deproclaimed as a provincial road to a municipal road.

The main roads surrounding the sites are:

- Nelson Mandela Drive (Provincial Road)
- Afguns Road
- Roads to Morapong Township and Grootegeluk Mine.

The nearest town to all the identified sites is Lephalale (Ellisras).

All these roads are expected to be affected with additional traffic relating to the Landfill Site and Hazardous Waste Facility generated traffic.

5.1.2 Current traffic flows

Refer to **Figures 4** which depicts the peak hour total vehicles traffic flows at the intersections within the study area.

Traffic counts were conducted by PD Naidoo & Associates (Pty) Ltd on Thursday 15 January 2009 from 06:00 in the morning to 18:00 in the afternoon.

The following peak traffic hours are evident from the surveys:

1. AM peak hour is from 06:00 to 06:59.
2. PM peak hour is from 16:30 to 17:30.

The traffic volumes from the existing counts were found to be of a very low nature, where some 20 percent of the road capacity is being used.

All road-based traffic flows in the area are expected to increase over time due to the increase in regional related background traffic and population increase which is directly proportional to the growth in traffic.

In terms of heavy and light vehicles, the major traffic flows occur along Nelson Mandela Drive. The existing road-based traffic situation at the intersections was analysed by the TSS Aimsun computer program. Scenario 1 in **appendix B** shows the levels of service for the 2009 existing situation. Scenario 1 can be summarised as follows:

Intersection 1: Morapong / Grootgeluk Mine Road / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to B during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 2: Road 1 / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 3: Access to Matimba / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 4: Afguns Road / Nelson Mandela Drive

The eastern approach shows a LOS E during the AM Peak hour due to the large volumes of traffic from the Lephalale side. A traffic signal is proposed on this intersection. The approaches with the proposed upgrade are operating at acceptable LOS ranging from A to C for both the AM and PM peak hours.

5.2 Road based infrastructure

5.2.1 Affected Road Infrastructure

Nelson Mandela Drive

The Class 2/3 provincial road running east west located south of the proposed development. It is a provincial road leading to Gaborone and it is served by one lane on each direction and turning lanes in all major intersections. The proposed access to the site is proposed along this road. It carries reasonable amount of traffic during the AM and PM peak hours.

Afguns Road

Afguns Road is a provincial road which has just been re-aligned northwards of Medupi Power Station. It is a provincial road leading to Steenbokpan and it is served by one lane on each direction. It is a major link between Medupi Power Station and the proposed General Landfill and Hazardous Waste Storage Facility Site. Typically the intersections are in the form of all-way stop streets (refer to Figure 2).

Roads Leading to Marapong Township and Grootegeluk Mine

It is a class 4 road with a lane in both directions and runs north-south of the proposed site. Typically the intersections are in the form of all-way stop streets. It is assumed that people from Marapong Township that will be working on the development would be bussed on to site using this route.

5.2.2 Haulage Road and Access

Haulage Road

Refer to **Appendix C** for copies of the Haulage Road drawings and its location relative to the access point. The new haul road leading to Matimba coal yard will intersect with Nelson Mandela Drive and will have one lane to each direction. An access to the landfill site will be located along this road. The road will have a weigh in bridge on both sides of the road. A drawing obtained from Metro GIS attached in **Appendix C** shows the position of the proposed road relative to Nelson Mandela Drive.

According to South African Roads Access Management (SARAM) and Provincial standards, a minimum of 600m between intersections is required. The proposed haulage road will intersect Nelson Mandela Drive (Provincial Road) within 600m from the existing intersection marked Road 1 in **Appendix B drawing 080874 / RL / 01** therefore it is proposed that the road leading to Grootguluk Mine be re-aligned as shown in the drawing to meet the required Provincial standards.

A short 60m right-turning lane from the eastern approach of Nelson Mandela Drive is further proposed. Refer to the **drawing 080874 / AL / 01** for more details.

Access to the Landfill Site

The proposed landfill Site will be served by an access which will be located along the new haulage road. The proposed access will form a T-Junction with the new haulage road and it will be stop controlled. The access will consist of one entry lane and one exit lane. A security boom gate should 100m from the provincial road.

6. ROAD-BASED TRAFFIC IMPACT ASSESSMENT

6.1 Trip generation

General Landfill Site and Hazardous Waste Facility:

There is no standard formula on the South African Trip Generation Manual (SATGM) of 1992 for Landfill Sites and Hazardous Waste Facility. The following assumptions were made in order to determine the expected generated trips:

- +/- 20 people including the foreman, supervisor etc. will be working on site during construction
- Most of the trips will be site bound during the construction period
- A total of 10 trucks will be operating and transporting construction materials during the construction phase
- The landfill is expected to accommodate 1200 000 m³ of both hazardous and general waste over a period of 50 years:

$$= \frac{1200\ 000\ m^3}{6\ m^3\ truck} = 200\ 000\ one\ way\ trips$$

$$= \frac{400\ 000\ two-way\ trips}{18\ 250\ days}$$

$$= \underline{21.9\ say\ 22\ trips\ a\ day}$$

- +/- 20 people including the site manager, supervisor etc will be working on the development once operational
- 80% of the people working on the project both during construction and post construction will be transported to site by the contractor or staff bus.
- 80% of the trips will happen during the off peak hours for both during construction and post construction
- Cover material will be imported to site using trucks
- Trucks bringing in GCL were taken into consideration
- High hazardous waste will have to be transported to a permitted H:H hazardous disposal facility. Temporary storage of hazardous waste may not exceed three months
- The material excavated will be stockpiled within the site.

Refer to the table below for estimated development trips

Table 4.1: Summary of Estimated Construction Trips

LAND USE	Weekday AM Peak Hour			Weekday PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Landfill Site and Hazardous Waste Facility	8	3	11	5	6	11
TOTAL	8	3	11	5	6	11

Table 4.2: Summary of Estimated Operational Trips

LAND USE	Weekday AM Peak Hour			Weekday PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Landfill Site and Hazardous Waste Facility	20	8	28	8	20	28
TOTAL	20	8	28	8	20	28

From the tables above it shows that the proposed development (Eskom Landfill) is expected to generate approximately 5 vehicular trips, 1 Bus trip and 5 trucks during the construction phase AM and PM Peak. It is also expected to generate additional 5 vehicular trips and 1 Bus trip and 22 Trucks trips once operational.

6.3 Trip distribution

The new trips that are expected to be generated by the proposed development were distributed and assigned to the adjacent road network based on the expected origin and destinations of the trips. Refer to **Figure 6** for Eskom Landfill Site expected trip generation and distribution. Refer to **Figure 7a** for **Expected Construction Trip Assignment** and **Figure 7b** for **Expected Operational Trip Assignment** for Eskom Landfill Site development.

Note: The construction Truck Trips will happen during the off peak hours but for analysis purposes these trips were added and assigned on the road network as the worst case scenario.

The following distribution for Eskom Landfill Site development was assumed:

- 70% from the east along Nelson Mandela Road;
 - 5% from the east along Nelson Mandela Drive;
 - 65% from the south along Afguns Road;
- 10% from the west along Nelson Mandela Road;
 - 5% from the west along Nelson Mandela Drive;
 - 5% from the north along Marapong Road;
- 10% from the north along Matimba Road;
- 10% from the north along a gravel Matimba Road.

6.4 Traffic implications

6.4.1 Basis of impact

In order to ascertain the impact of a development, on the congestion and level of service on roads surrounding the site, critical intersection movements need to be analysed. It is not good enough to simply look at the traffic on the links (between intersections) since congestion is normally related to the downstream intersection capacity. This is usually where the bottlenecks are found. Refer to **appendix B** for all scenarios as described on **table 3 in chapter 4**. Scenario 4, 5 and 6 in **appendix B** shows the levels of service for the 2009 Background traffic + development (operational), 2014 background traffic and 2014 background + development traffic. The above scenarios can be summarised as follows:

Intersection 1: Morapong / Grootgeluk Mine Road / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to D during both AM and PM Peak hours in all 3 scenarios. No road improvements required on this intersection.

Intersection 2: Road 1 / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to E during both AM and PM Peak hours for all 3 scenarios. No road improvements required on this intersection.

Intersection 3: Access to Matimba / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 4: Afguns Road / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from B to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 5: Haulage Road / Access to Site

All approaches are operating at acceptable LOS ranging from A to B during both AM and PM Peak hours. No road improvements required on this intersection.

6.5 Construction vehicles on the surrounding road network

6.5.1 General traffic impact regarding construction activities

The impact on the road network relating to construction activities mainly concerns Nelson Mandela Drive. It is expected that construction vehicles will use Nelson Mandela Drive to haul construction materials. The lesser impact expected will be slowing down of traffic flows along Nelson Mandela Drive due to the trucks transporting construction material from a Quarry or a Borrow Pitt or even the transportation of big heavy construction equipment by road.

Most of the trips due to construction will travel during off peak hours. The impact due to construction is temporal and minimal. The impact on the pavement loading will be moderate.

Goba Consulting Engineers proposed in the Medupi Power Station Traffic Impact Assessment that the Nelson Mandela Drive from Lephalale to Marapong be rehabilitated not later than 2010 June therefore no additional rehabilitation will be proposed for the purpose of this report. Scenario 3 on **Appendix B** shows the LOS for 2009 Background Traffic + Development (Construction Trips). This scenario can be summarised as follows:

Intersection 1: Morapong / Grootgeluk Mine Road / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to D during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 2: Road 1 / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to D during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 3: Access To Matimba / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from A to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 4: Afguns Road / Nelson Mandela Drive

All approaches are operating at acceptable LOS ranging from B to C during both AM and PM Peak hours. No road improvements required on this intersection.

Intersection 5: Haulage Road / Access to Site

All approaches are operating at acceptable LOS A during both AM and PM Peak hours. No road improvements required on this intersection.

6.6 Impacts on traffic safety

Table 10 below summarises the traffic impact with regards to safety.

Construction related traffic

The impact of construction traffic is normally high due to high differences in the travelling speeds of each associated vehicle. This means that the probability of accidents occurring is significantly increased and therefore must be adequately addressed as part of the construction management process in order to minimise the probability of potential accidents occurring. Construction vehicles on the surrounding road network do not generally require special mitigating measures except the make sure that these vehicles are properly road worthy and display the regulated vehicle related signage.

The reason for addressing the traffic safety of construction vehicles and pedestrians is that there is normally traffic-related conflicts between the two modes of transport that require control if serious, if not fatal accidents, are to be prevented. Similarly, the conflict between construction related traffic and new bridges require management to prevent serious and fatal accidents from occurring.

Operational related traffic.

As seen in **Chapter 6.4.1**, the impact of the operational-related traffic is generally not high and is not expected to cause problems.

The reason throughput needs to be considered is that congestion will result if the capacity available is less than the expected traffic demand. Similarly, the traffic delays often cause changes in driver behaviour patterns leading to driving that is negative since the driver is frustrated. This type of driving can often lead to serious or fatal accidents.

All the above related safety issues are highly significant and need to be addressed in the Traffic Management Plan associated with the appointed contractor.

TABLE 5: ALL SCENARIOS

	Source of impact	Nature of impact	Scale	Duration	Intensity	Probability	Confidence	Significance	
								Without mitigation	With mitigation
Construction	Manoeuvrability of construction vehicles and pedestrians during construction will have to be monitored.	Safety will be the most important factor.	Local	Construction Period	Medium to high	Definite	High	High	Low
	Construction vehicles on the surrounding road network	Traffic congestion and road safety	Network	Construction Period	Medium to high	Definite	High	High	Low
Operational	Throughput (volume to capacity ratio)	Traffic congestion	Local,	Permanent	Low to medium	Definite	High	High	Low
	Delay to vehicles (Level of service)	Driver frustration and unsafe driving behaviour potentially occurring	Local	Permanent	High	Definite	High	High	Low

7. MITIGATION MEASURES PROPOSED

All mitigating measures are significant and essential.

The traffic volume within the study area is fairly average. All the intersections that were analysed in this report were not badly affected except for one Nelson Mandela / Afguns Road intersection. This was due to the growth in through background traffic from the east to west along Nelson Mandela Drive. A traffic signal is proposed as a mitigation measure in order to reduce the delays on this intersection.

A short right turning lane from the eastern approach and the re-alignment of the road leading to Grootguluk Mine on the south of Matimba is further proposed at intersection Nelson Mandela Drive / the new Haulage Road.

8. CONCLUSIONS

The following can be concluded:

1. The proposed Eskom Landfill Site will be located on the farm of Grootstryd in Lephalale.
2. The proposed development will gain access via the new haulage road. The new haulage road leads to Matimba coal yard and will consequently intersect with Nelson Mandela Drive and form a fourth leg on the northern side. The proposed access will form a T-junction with the new haulage road and it will be stop controlled. Refer to drawing 080874 / AL / 01.
3. The road leading to Grootgeluk Mine on south side of Matimba requires re-alignment in order to meet the provincial standards.
4. It is expected that the proposed landfill site and hazardous waste facility will generate +/- 28 trips once operational.

5. The following road upgrades are proposed:

- ❖ Nelson Mandela Drive / Afguns Road – It is proposed that the intersection be converted from a three way stop to a signalised intersection. The Provincial Government (LRA) is fully responsible for this upgrade.
- ❖ Nelson Mandela Drive / New Haulage Road– a short- right turning lane is proposed on the eastern approach to accommodate the traffic turning right. It is further proposed that the road that leads to the mine located south of Matimba be re-aligned and form a fourth leg on the south of this intersection. Eskom is fully responsible for all the upgrades proposed at this intersection.

9. RECOMMENDATIONS

Given the findings of this report, the following recommendations are made:

- The access to the site is proposed along the haulage road. Site 5a and 5c are equally suitable for this development in terms of Traffic and Transportation due to their close proximity to the proposed haulage road however site 5b can still be used. Refer to drawing **Medupi Landfill – Site 5 – 5ha Options in Appendix C**.
- The proposed development should be considered favourably from a traffic engineering point of view by the relevant authorities, given the proposed access.
- The developer (Eskom) will be fully responsible for the upgrades at the intersection of Nelson Mandela Drive / The New Haulage Road (Main entrance to site) and for the construction of the access to the development.
- The provincial Government (Limpopo Roads Agency) will be fully responsible for the upgrades on intersection Nelson Mandela Drive / Afguns Road.
- At the time of construction and as a responsibility of the contractor, a traffic engineer draft a Traffic Management Plan (TMP) incorporating traffic safety issues. These plans will have to be directly linked to safety of pedestrians, construction vehicles, protection of the road network from damage, etc. Where possible construction vehicle should travel during off-peak periods to minimize potential congestion and excessive delays in traffic times.
- The detail design of the proposed road upgrades, traffic signals and access should be designed by a professional engineer with suitable road design experience.

10. REFERENCES

1. BKS (Pty) Ltd, Manual for Traffic Impact Studies, Department of Transport, October 1995.
2. BKS (Pty) Ltd, South African Trip Generation Rates, Department of Transport, Pretoria, June 1995.
3. Meeting and discussions with Municipal Roads Authorities January 2009.
4. Medupi Power Station TIA by Goba Consulting Engineers.

APPENDIX A FIGURES

APPENDIX B

CAPACITY ANALYSIS

APPENDIX C DRAWINGS